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Davis et al.

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(54) **HEEL FLOAT THERAPEUTIC FOOTWEAR**

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(51) **Int. Cl.**

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A61F 5/058	(2006.01)
A61F 5/01	(2006.01)

(52) **U.S. Cl.**

CPC ***A61F 5/0585*** (2013.01); *A61F 5/019* (2013.01); *A61F 5/0111* (2013.01)

(58) **Field of Classification Search**

CPC A61F 5/0585

See application file for complete search history.

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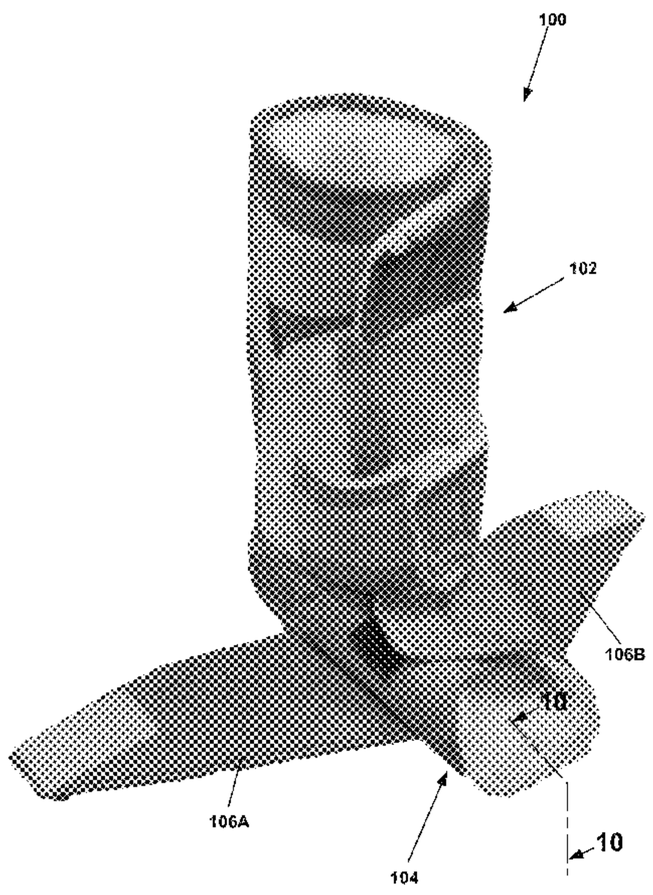
(57) **ABSTRACT**

A heel float therapeutic footwear for people that spend a large amount of time in bed. The heel float therapeutic footwear includes a lower leg support portion, a foot support portion, and a wing support structure. The foot support portion extends from the lower leg support portion and includes a foot support platform. The wing support structure is permanently attached to the foot support platform. The wing support structure is adjustably fastenable to a side of the lower leg support portion to adjustably support a position and an angle of the foot support platform with respect to the lower leg support portion. A method of making a heel float therapeutic footwear is also disclosed.

16 Claims, 17 Drawing Sheets



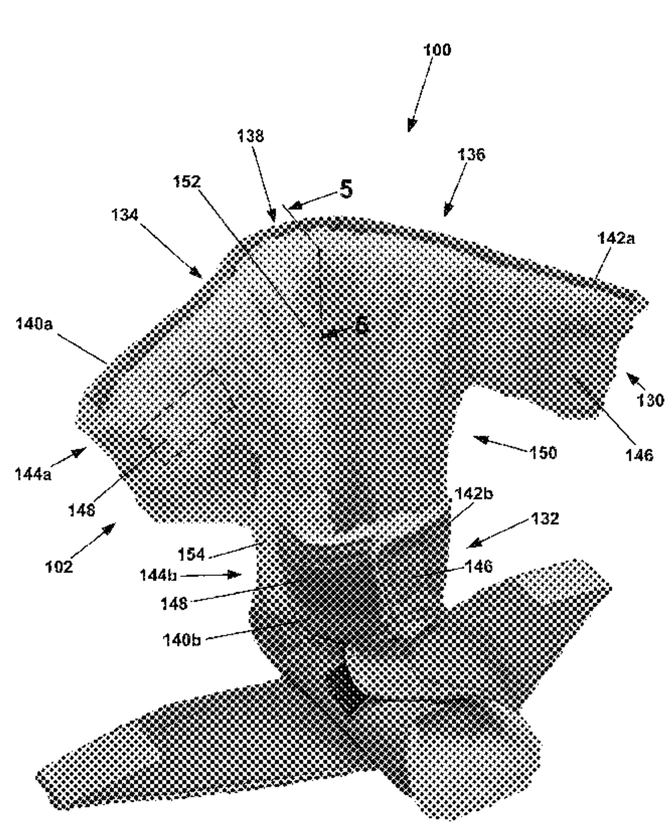


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FIG. 1

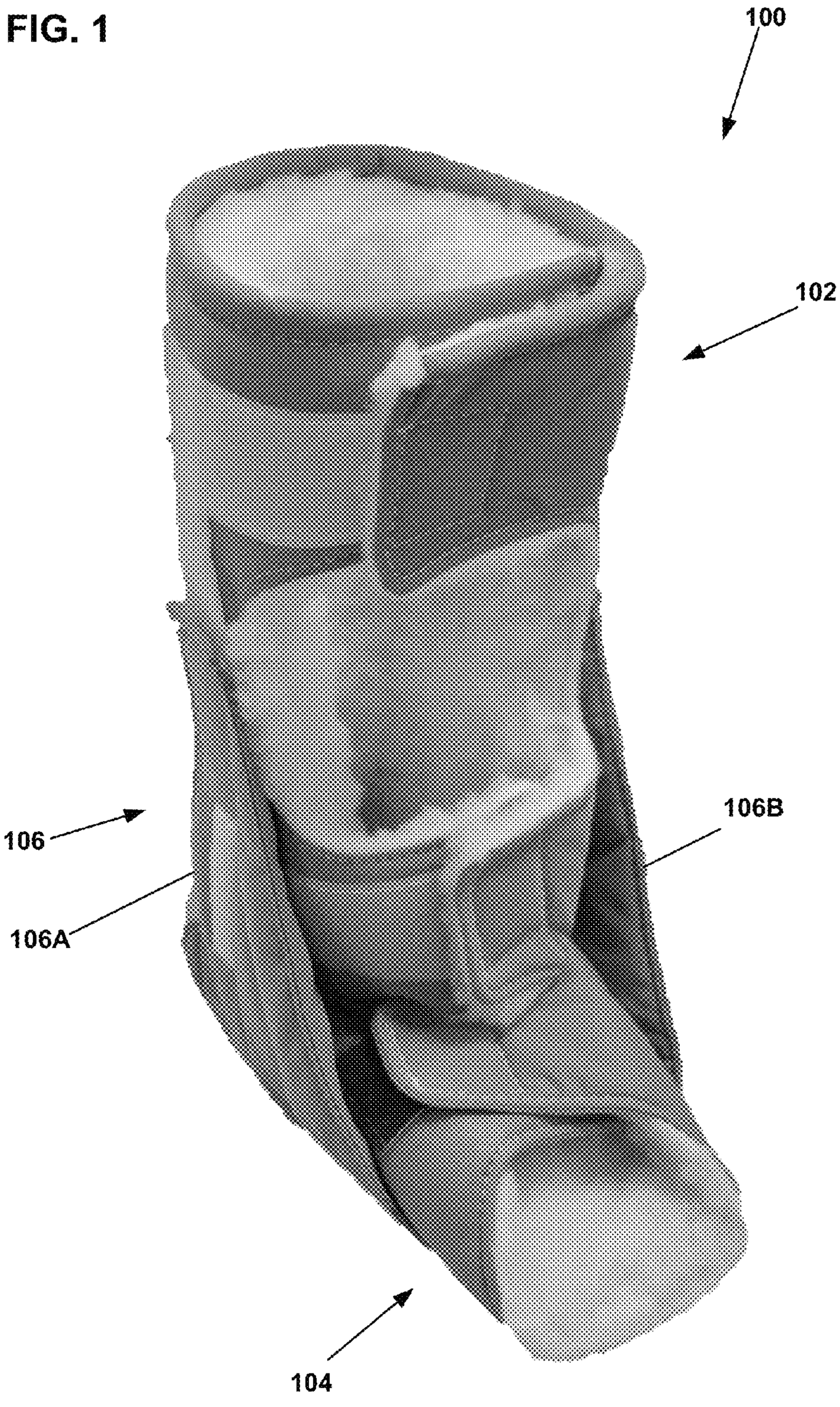


FIG. 2

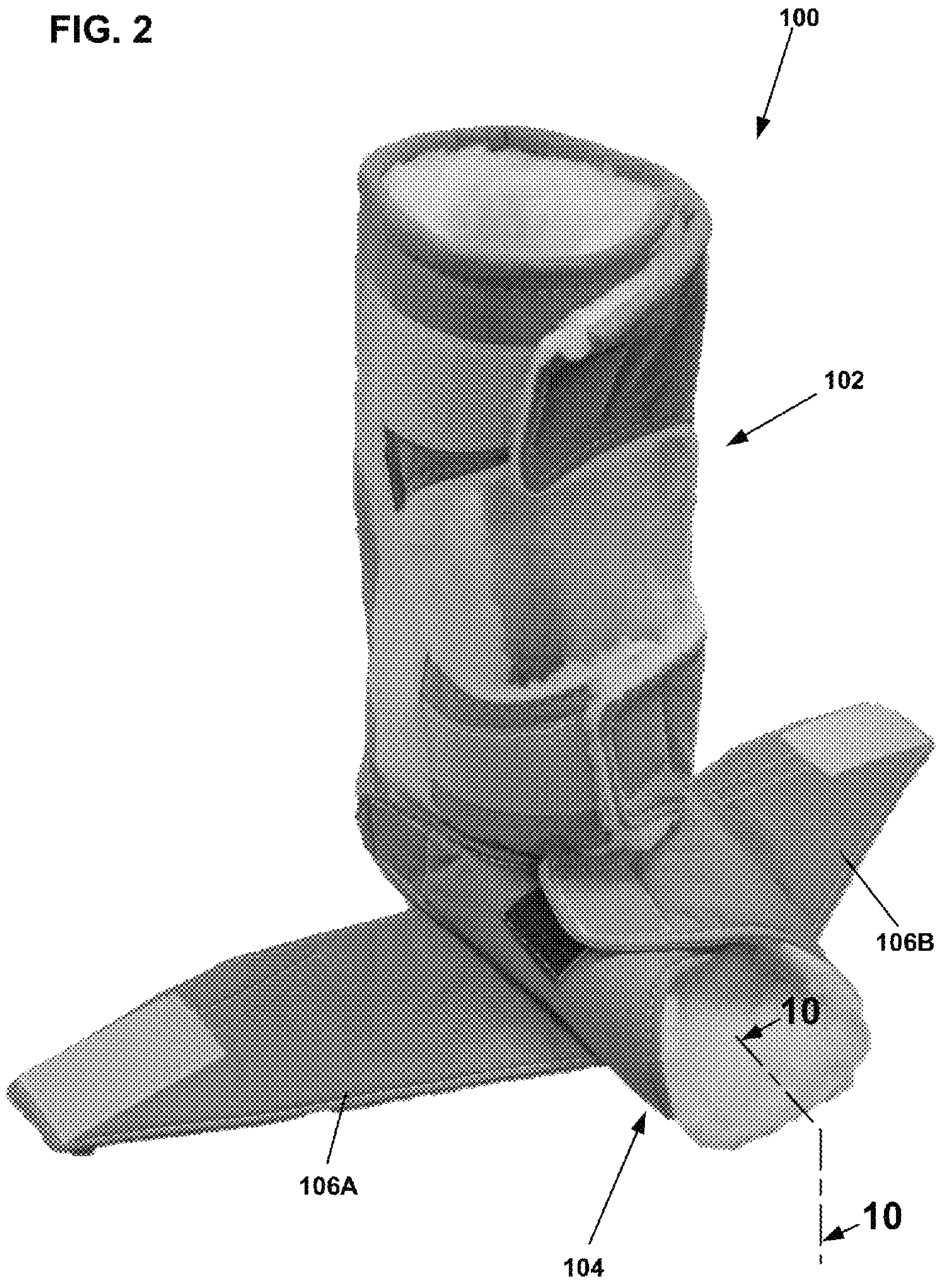


FIG. 3

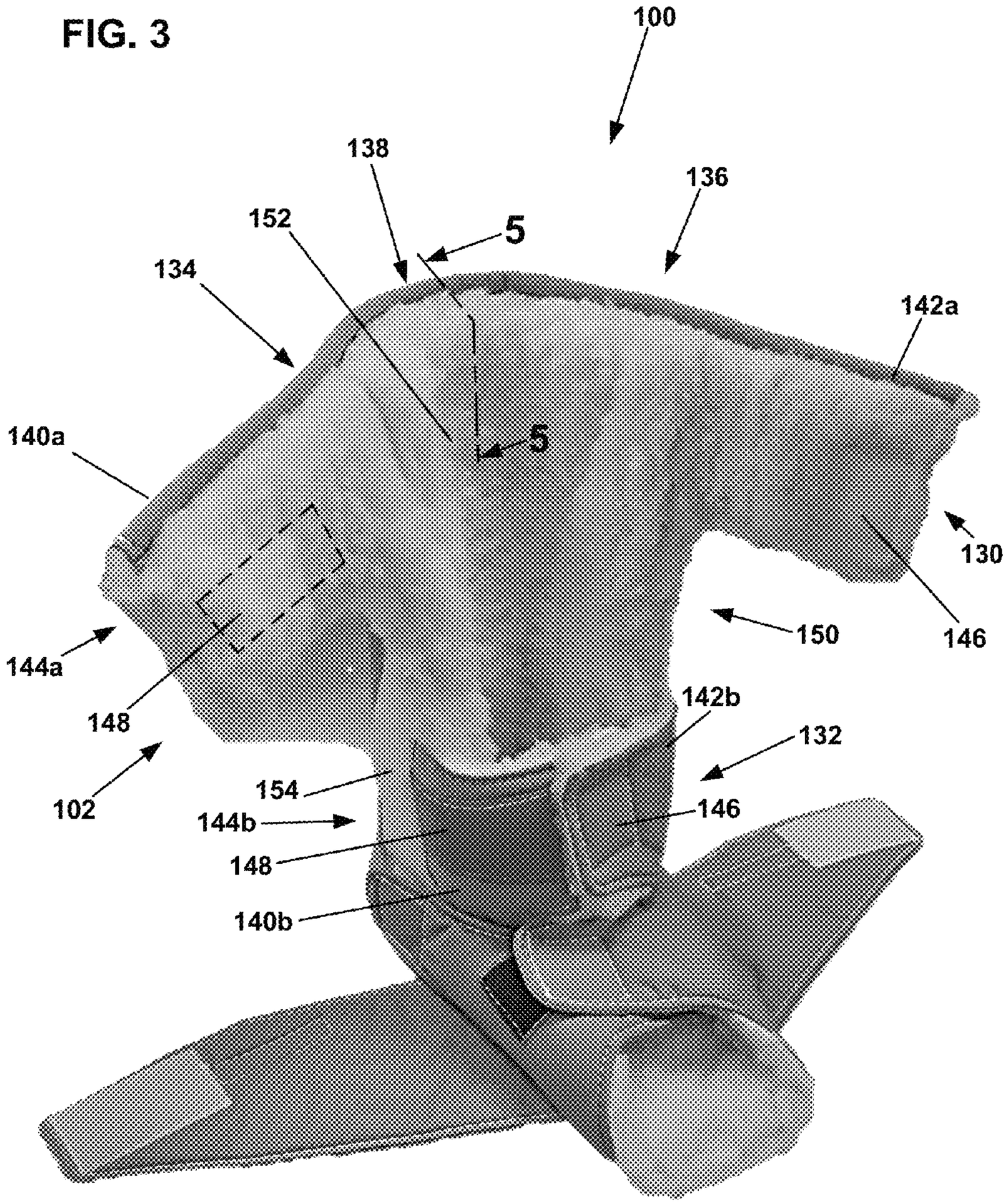

100
138
136
152
5
134
142a
140a
5
130
150
146
144a
148
142b
132
154
102
144b
146
148
140b

FIG. 4

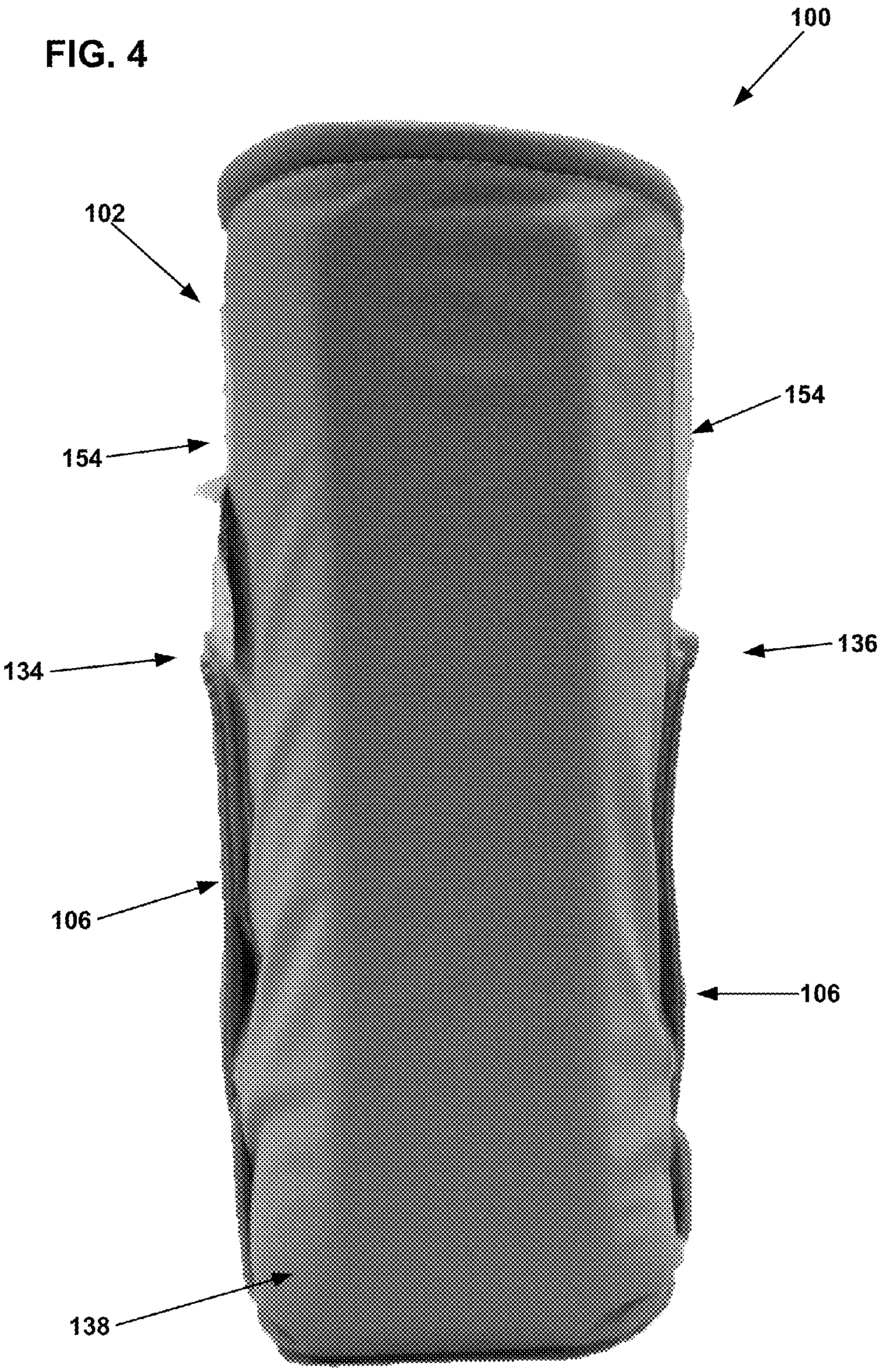


FIG. 5

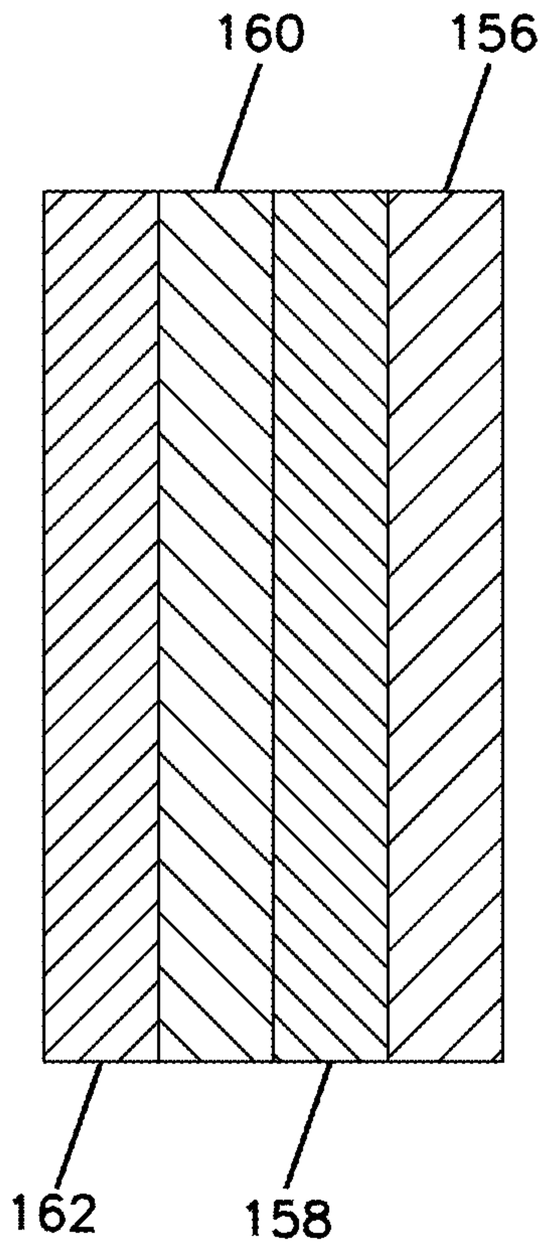
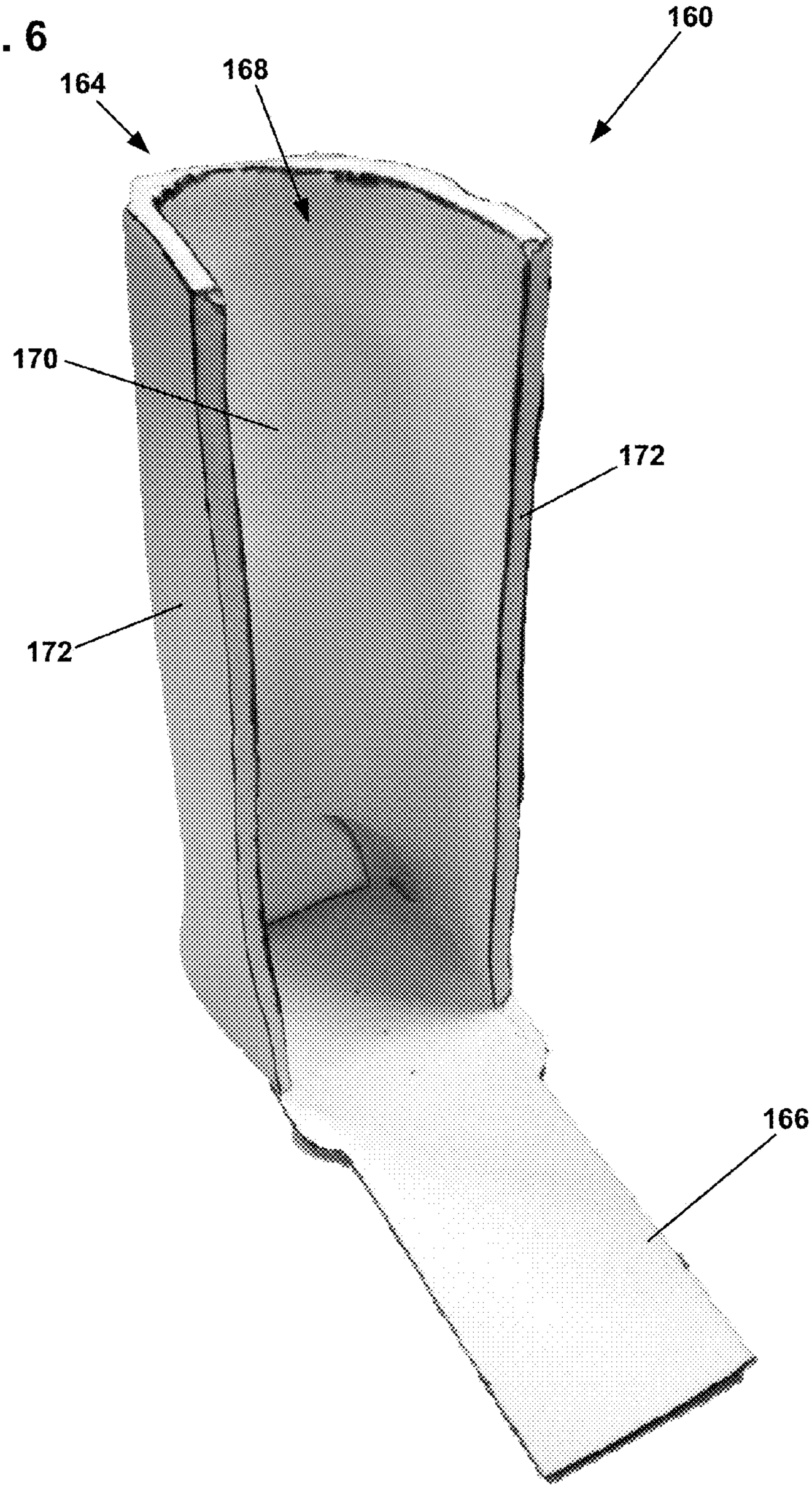


FIG. 6



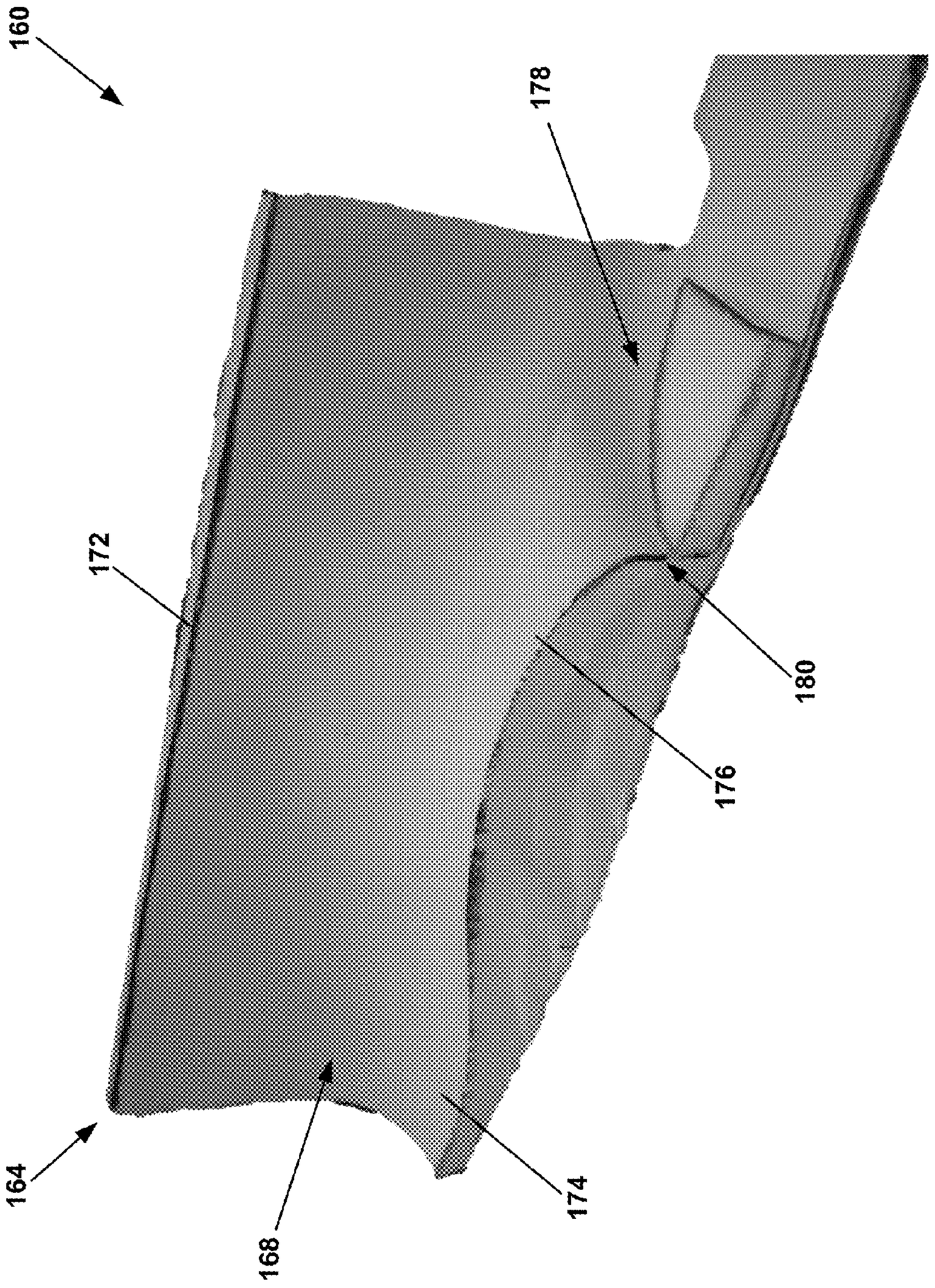


FIG. 7

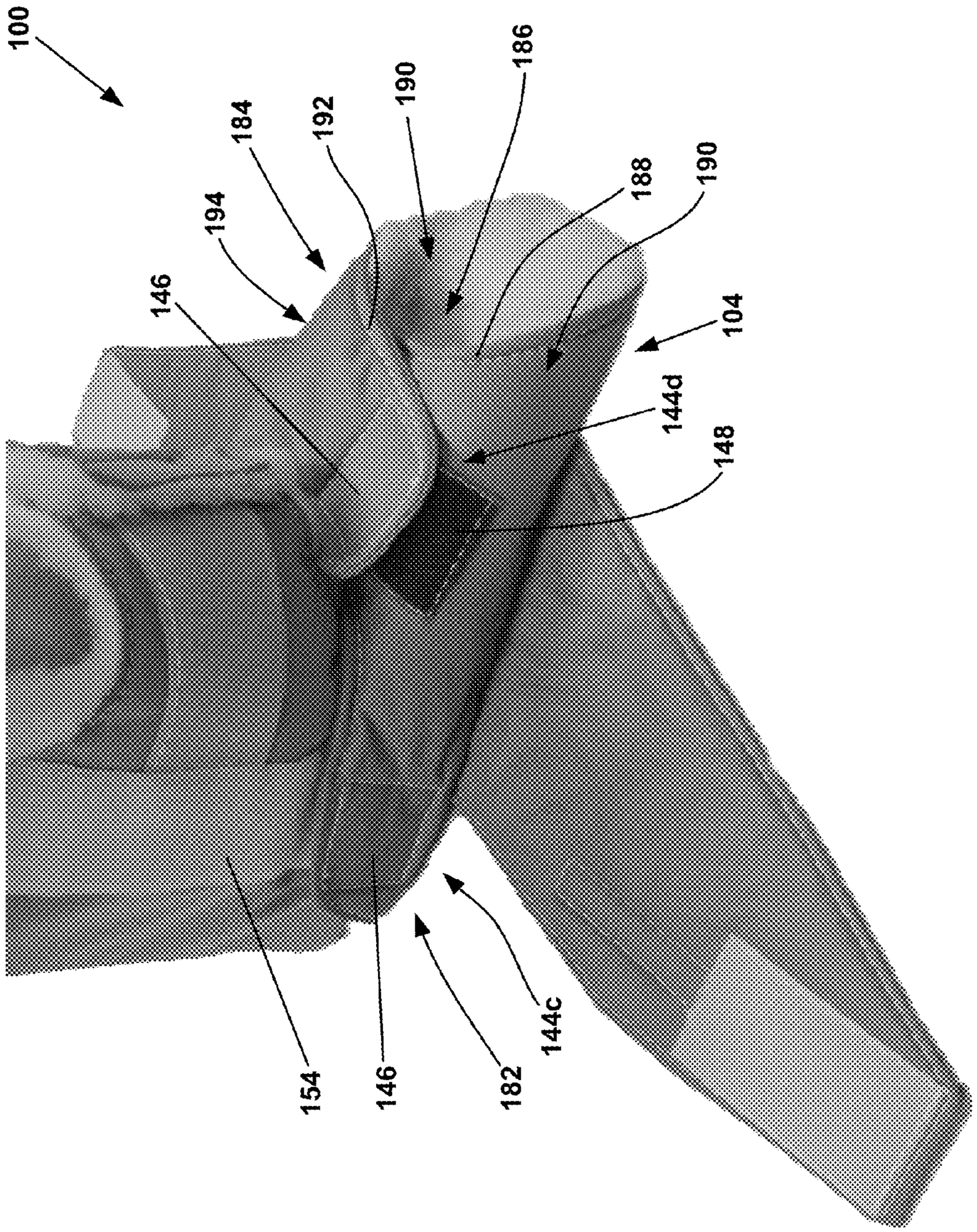

100
184
192
190
186
194
188
190
146
104
144d
148
154
146
182
144c

FIG. 8

FIG. 9

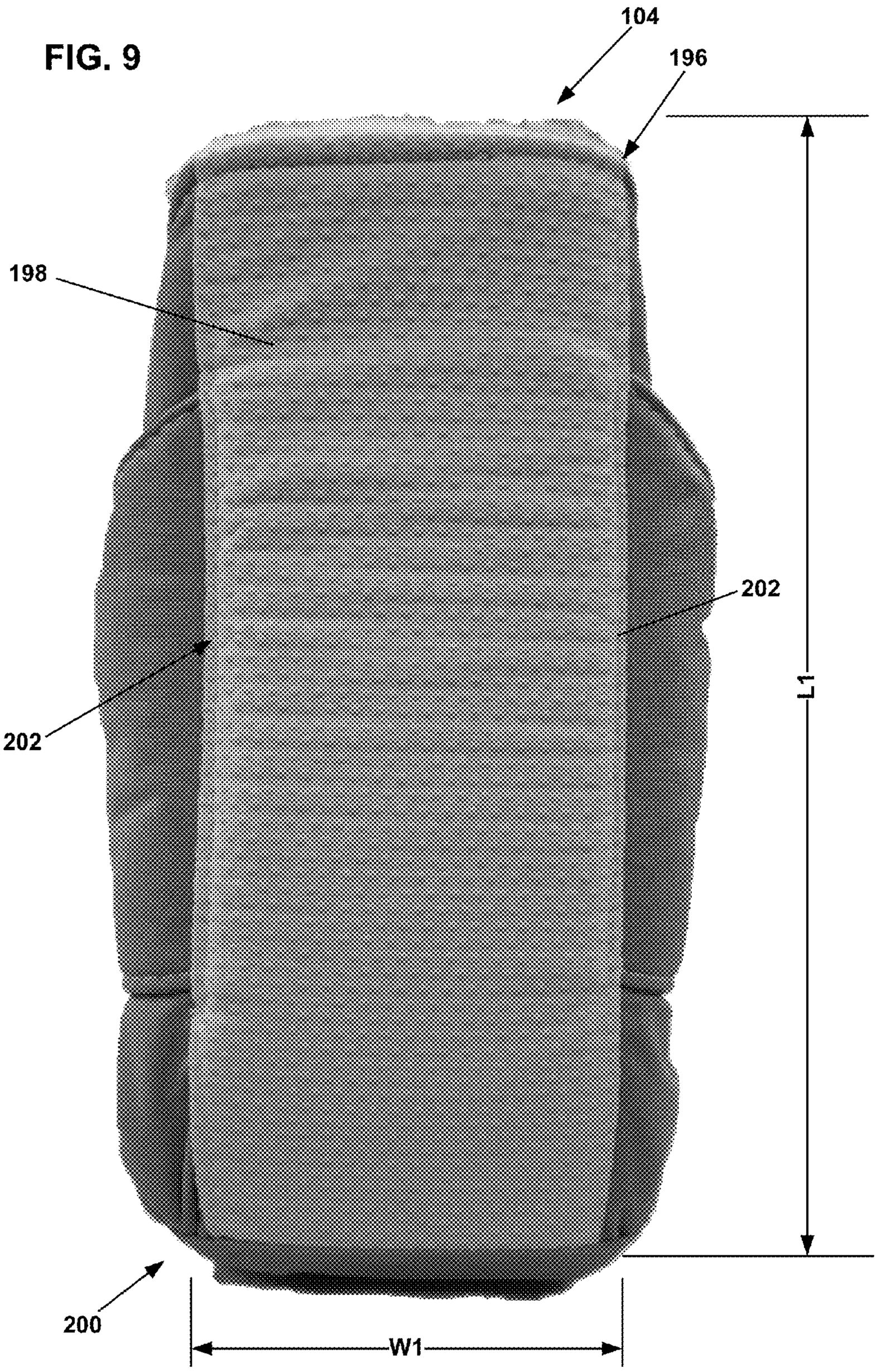
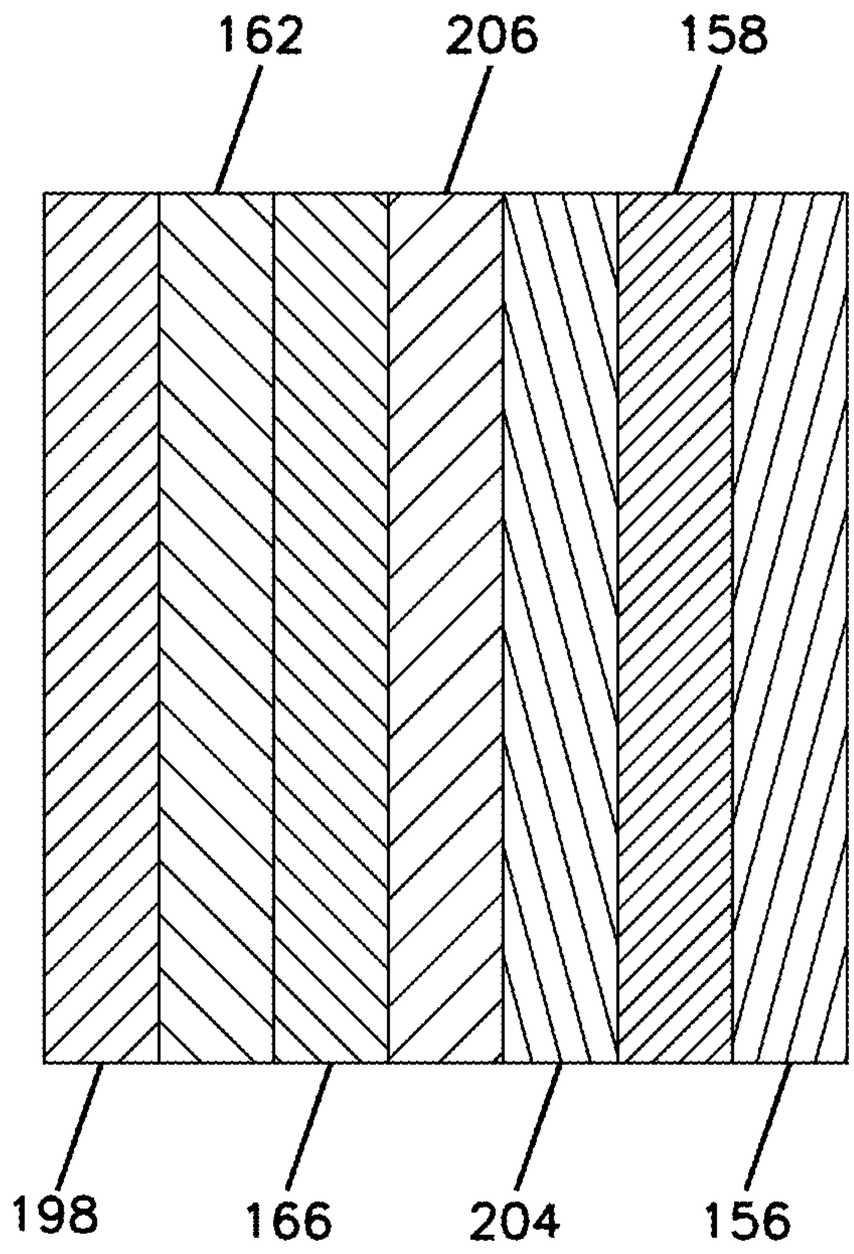


FIG. 10



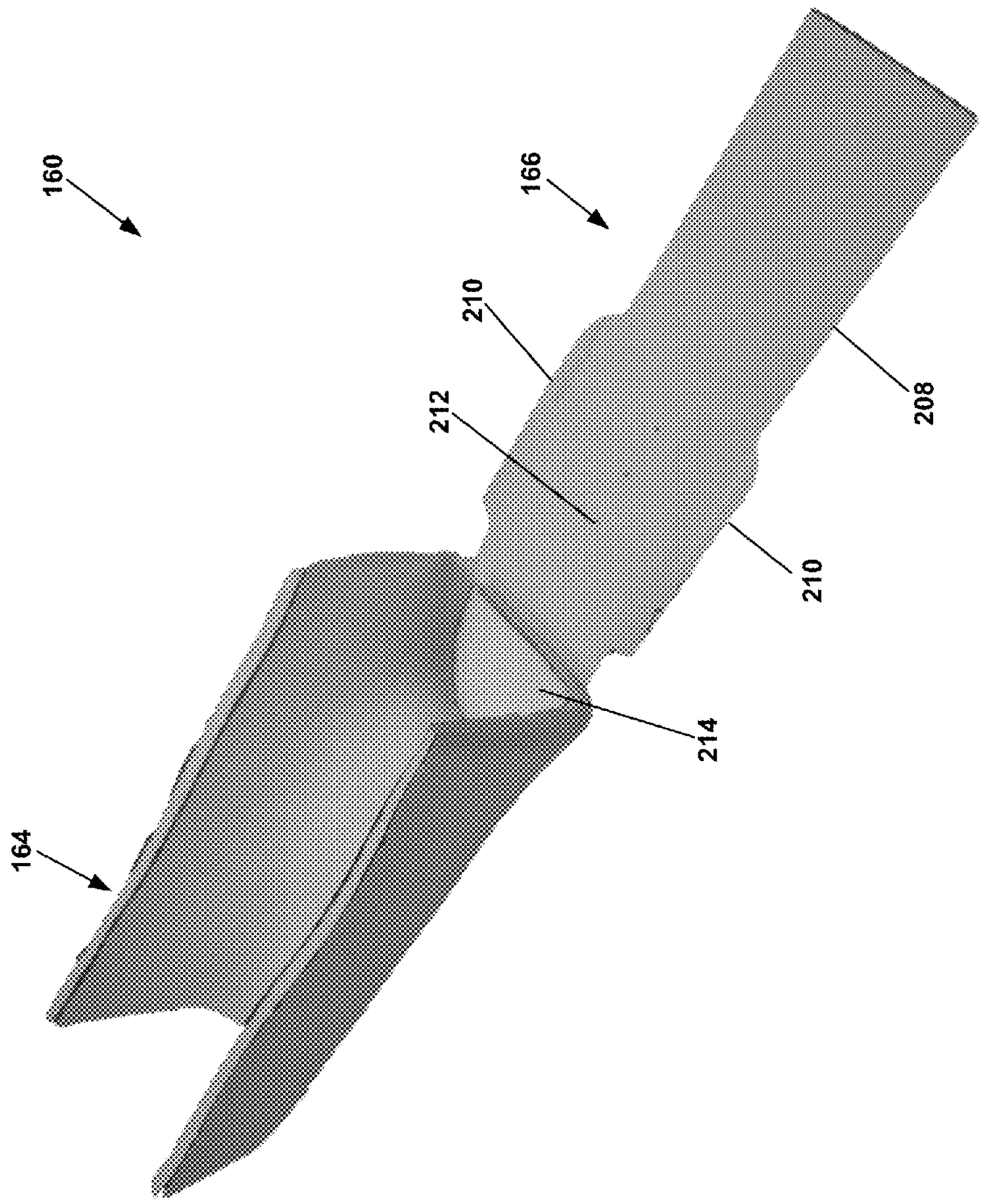


FIG. 11

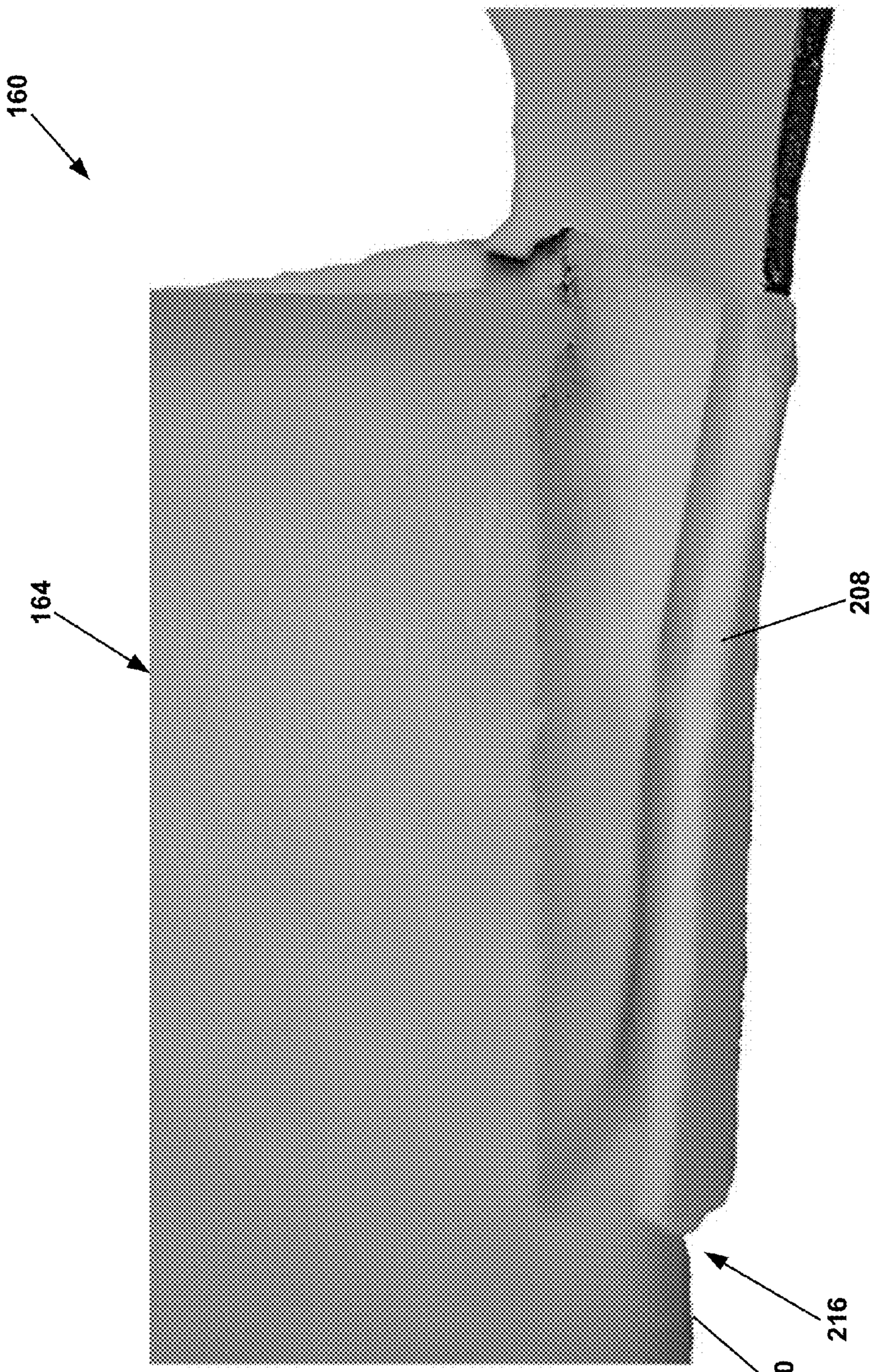


FIG.12

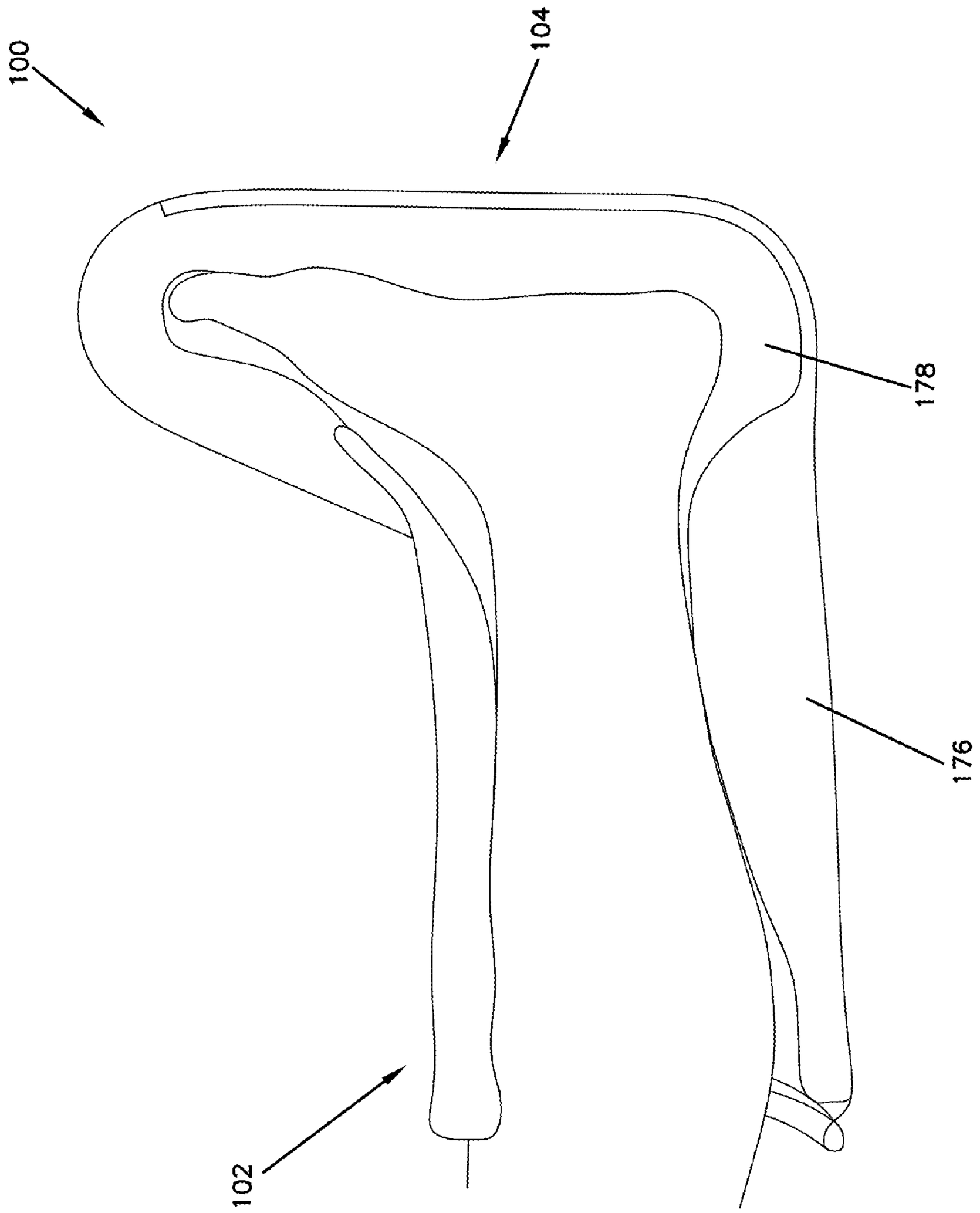
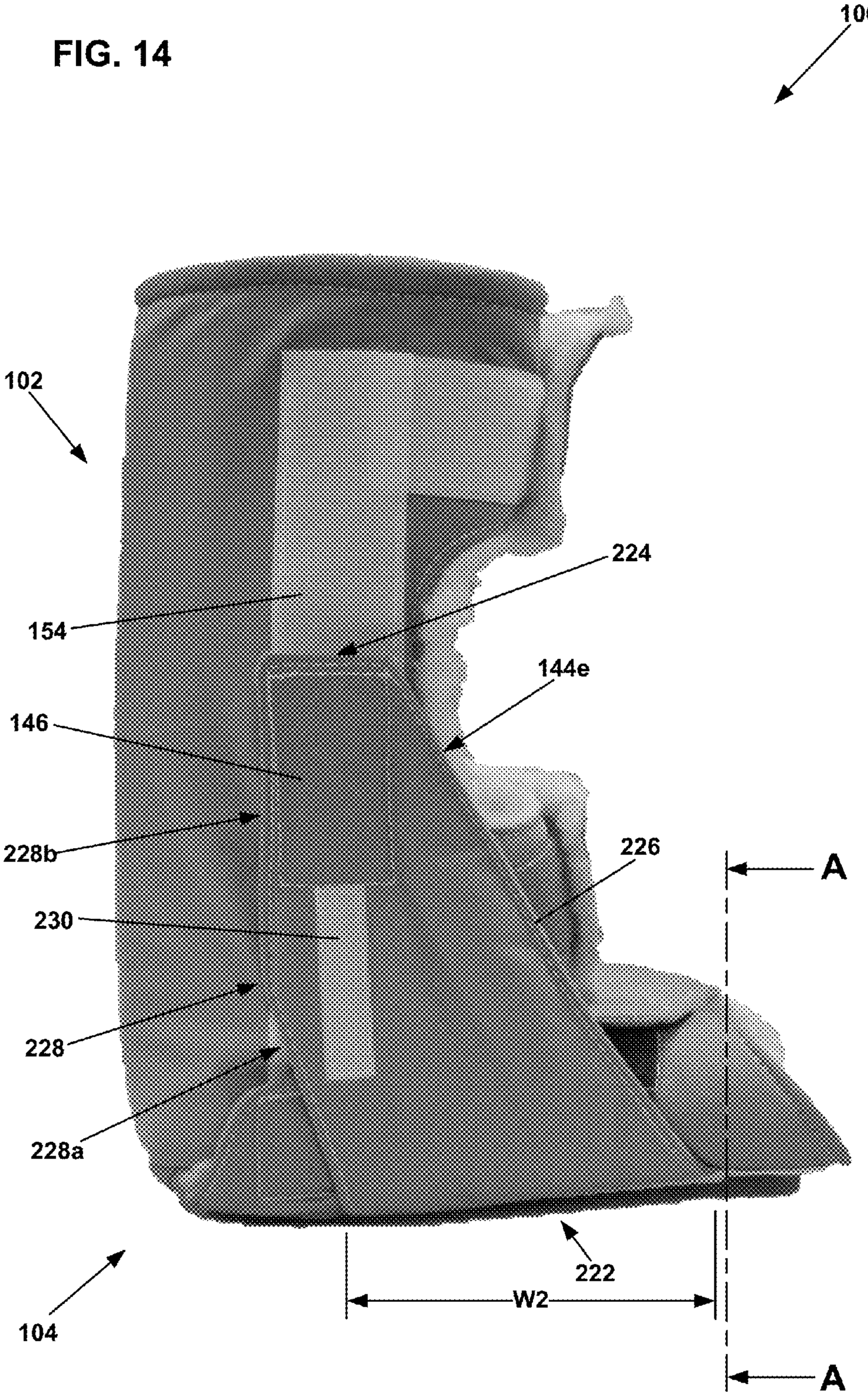


FIG. 13

FIG. 14



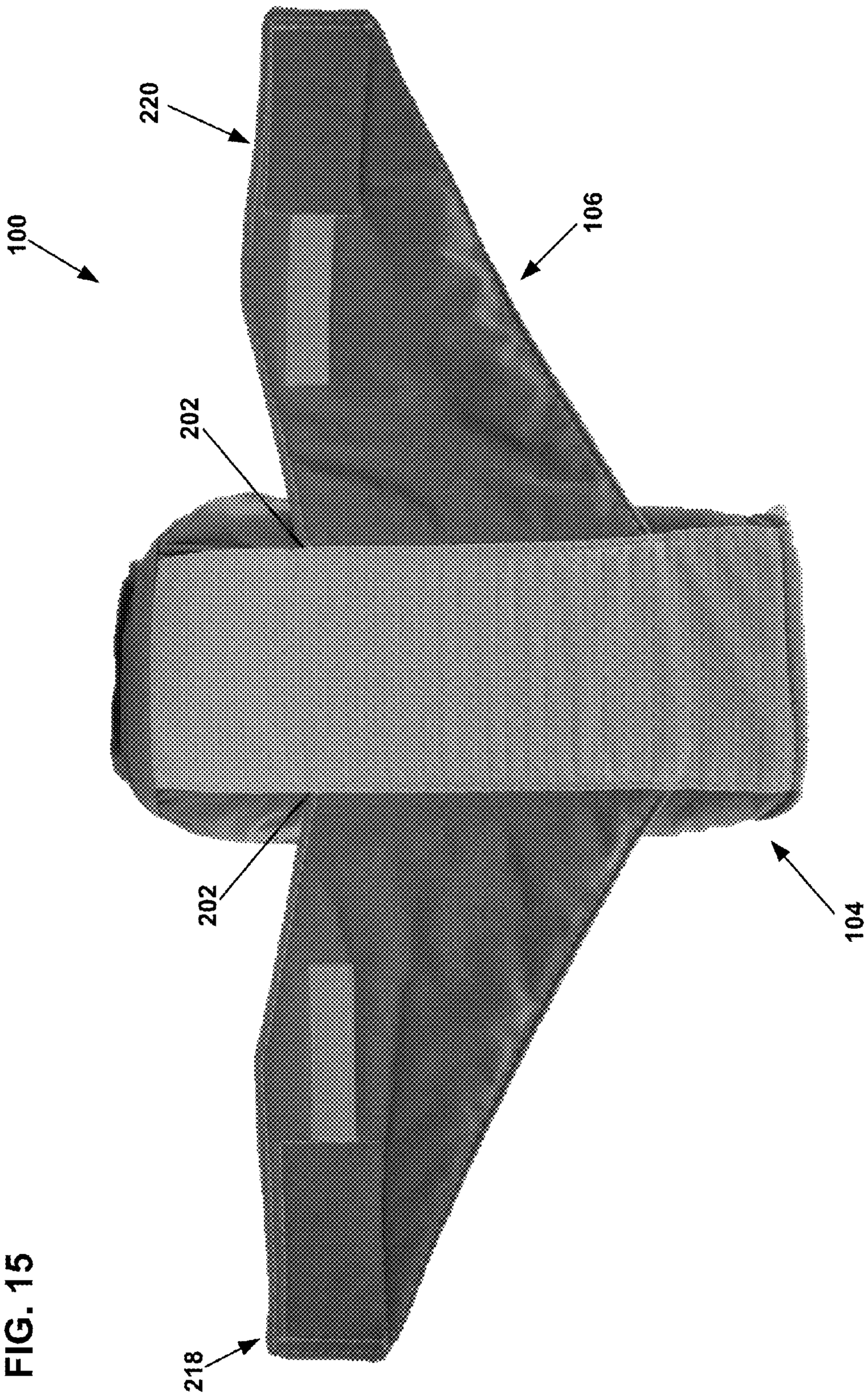


FIG. 15

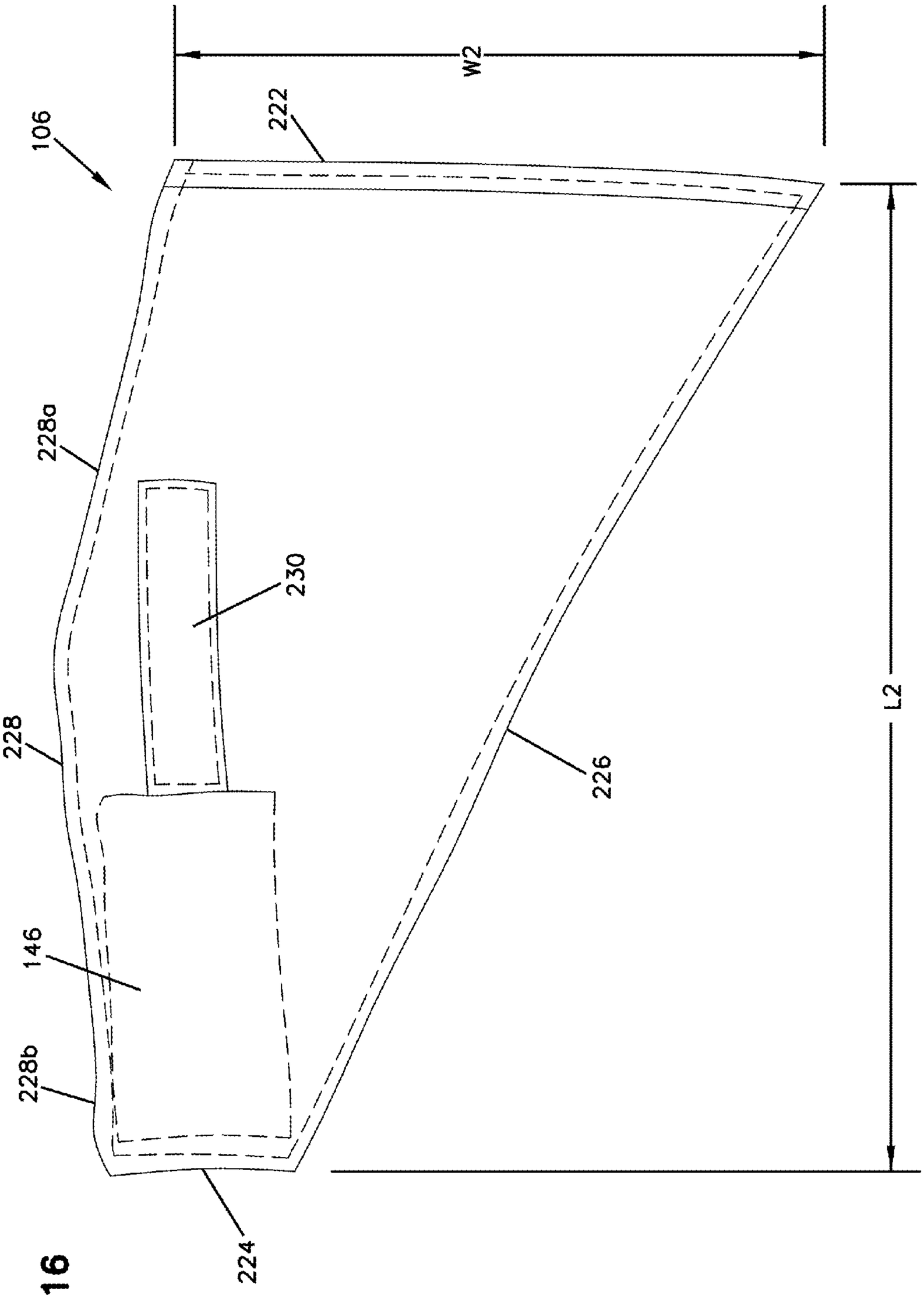


FIG. 16

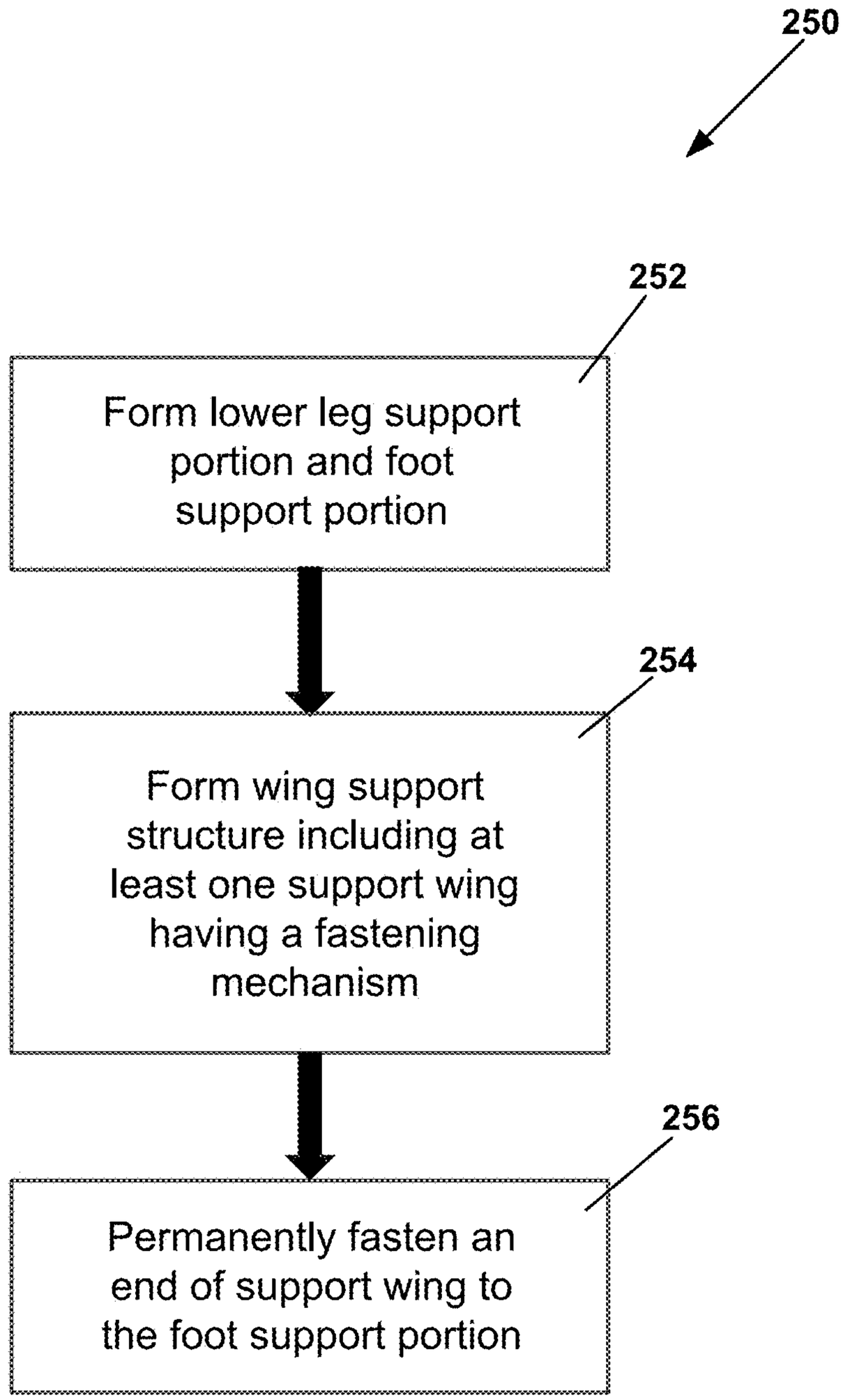

250
252
Form lower leg support portion and foot support portion
254
Form wing support structure including at least one support wing having a fastening mechanism
256
Permanently fasten an end of support wing to the foot support portion

FIG. 17

HEEL FLOAT THERAPEUTIC FOOTWEAR

BACKGROUND

Hospital patients are sometimes bed ridden for long periods of time. In some situations the patient can experience problems associated from lying down in one position for so long. For example, patients with vascular disease need to have good blood circulation to prevent clotting. The proper pre and post-operative footwear is needed to prevent vasoconstriction and promote vasodilation. In addition to maintaining proper blood circulation, the foot must be prevented from pointing in the downward direction or leaning to the side, a problem recognized in the industry that can lead to foot drop. Foot drop is a condition that may occur after lying in bed for some time without getting up or walking. Foot drop is the dropping of the forefoot due to weakness, damage to the peroneal nerve or paralysis of the muscles in the anterior portion of the lower leg. It is characterized by the inability or difficulty in moving the ankle and toes upward and thereby leading to the improper rotation of the foot. Heel or foot ulcers are another condition that can develop as a result of the heel rubbing against the pre or post-operative footwear or pressure being placed on the heel while lying in a hospital bed.

SUMMARY

In general terms, this disclosure is directed to a heel float therapeutic footwear apparatus. In one possible configuration, and by non-limiting example, a heel float therapeutic footwear apparatus includes a lower leg support portion, a foot support portion, and a wing support structure.

One aspect is a heel float therapeutic footwear apparatus comprising: a lower leg support portion; a foot support portion extending from the lower leg support portion; the foot support portion including a foot support platform; and a wing support structure permanently attached at a first end portion to the foot support platform, and having a second end portion that is adjustably fastenable to a side of the lower leg support portion.

Another aspect is a heel float therapeutic footwear apparatus comprising: a lower leg support portion configured to support a lower leg of a patient, the lower leg support portion including a lower leg support cradle having a raised portion, the raised portion configured to elevate a heel of the patient when the patient is lying on the patient's back to reduce pressure on the patient's heel; a foot support portion connected to and extending from the lower leg support portion; the foot support portion including a foot support platform extending from the lower leg support cradle; and a wing support structure having a first end portion and a second end portion, the wing support structure permanently attached to the foot support platform at the first end portion, and being adjustably fastenable at the second end portion to a side of the lower leg support portion to adjustably support a position and an angle of the foot support platform with respect to the lower leg support portion.

A further aspect is a method of making a heel float therapeutic footwear apparatus, the method comprising: forming a lower leg support portion and a foot support portion, the foot support portion including a foot support platform; forming a wing support structure including a left support wing and a right support wing, each of the wings including a first end portion and a second end portion, wherein the second end portions are configured to be adjustably fastened to opposite sides of the lower leg support portion; and permanently fastening the first end portions of the left and right support wings to the foot support portion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is perspective view of an example of a heel float therapeutic boot with a wing support structure fastened in accordance with the principles of the present disclosure.

FIG. **2** is perspective view of the heel float therapeutic boot shown in FIG. **1** with the wing support structure unfastened.

FIG. **3** is a perspective view of the heel float therapeutic boot shown in FIG. **2** with upper overlapping members unfastened.

FIG. **4** is a perspective back view of the heel float therapeutic boot shown in FIG. **1**.

FIG. **5** is a component view of a portion of the heel float therapeutic boot shown in FIG. **3** taken along line **5-5**.

FIG. **6** is a perspective view of an example of a heel float cradle in an upright position in accordance with the principles of the present disclosure.

FIG. **7** is a cross-sectional view of a portion of the heel float cradle shown in FIG. **6**.

FIG. **8** is a perspective view of a portion of the heel float therapeutic boot shown in FIG. **2**.

FIG. **9** is a bottom perspective view of the heel float therapeutic boot shown in FIG. **1**.

FIG. **10** is a component view of a portion of the heel float therapeutic boot shown in FIG. **2** taken along line **10-10**.

FIG. **11** is a perspective view of the heel float cradle shown in FIG. **6** without being in an upright position.

FIG. **12** is an enlarged view of a portion of the heel float cradle shown in FIG. **11**.

FIG. **13** is a cross-sectional view of the heel float therapeutic boot shown in FIG. **1** with a lower leg of a patient.

FIG. **14** is a side perspective view of the heel float therapeutic boot shown in FIG. **1**.

FIG. **15** is a bottom perspective view of the heel float therapeutic boot shown in FIG. **1** with the wing support structure unfastened.

FIG. **16** is an enlarged view of the wing support structure shown in FIG. **15**.

FIG. **17** is a flow chart illustrating a method of making a heel float therapeutic footwear apparatus in accordance with the principles of the present disclosure.

DETAILED DESCRIPTION

Various embodiments will be described in detail with reference to the drawings, wherein like reference numerals represent like parts and assemblies throughout the several views. Reference to various embodiments does not limit the scope of the claims attached hereto. Additionally, any examples set forth in this specification are not intended to be limiting and merely set forth some of the many possible embodiments for the appended claims.

FIGS. **1-2** are perspective views of an example of a heel float therapeutic boot **100**. In this example, the heel float therapeutic boot **100** includes a lower leg support portion **102**, a foot support portion **104**, and a wing support structure **106**. In FIG. **1**, the wing support structure **106** are configured as being attached to the heel float therapeutic boot **100**. In FIG. **2**, the wing support structure **106** is shown as being open and unfastened to the heel float therapeutic boot **100**.

The heel float therapeutic boot **100** can be worn by hospital patients to help support the foot of a patient and off-load weight from the heel of the patient. The heel float

therapeutic boot **100** may help to prevent foot drop by keeping the foot in an upright position thereby preventing the foot from falling over to one side or from pointing toward the foot of the bed while lying down. The heel float therapeutic boot **100** can also be used to elevate the heel so that it does not rub on the bottom of the boot or on the padding. The heel float therapeutic boot **100** supports the foot in a preferred position.

The lower leg support portion **102** may be considered the main body of the heel float therapeutic boot **100** and typically covers the lower leg portion of a patient's leg including at least a portion of the calf and ankle. The lower leg support portion **102** helps protect against pressure ulcers formed on the skin and keeps the legs warm. The lower leg support portion is illustrated and described in more detail with reference to FIGS. **3-7**.

The foot support portion **104** of the heel float therapeutic boot **100** extends adjacent to the lower leg support portion **102** and covers portions of the foot area. The foot support portion **104** helps protect against pressure ulcers formed on the skin and keeps the feet warm. In some embodiments, the foot support portion **104** is connected to the lower leg support portion **102** creating a hinge between the two. The foot support portion **104** is illustrated and described in more detail with reference to FIGS. **8-12**

The wing support structure **106** of the heel float therapeutic boot **100** supports the foot in a preferred position. The wing support structure **106** is attached to the heel float therapeutic boot **100** and is configured to be adjustable to obtain the preferred position. The wing support structure **106** is illustrated and described in more detail with reference to FIGS. **14-16**.

FIGS. **3-5** illustrate features of the lower leg support portion **102**.

FIGS. **3-4** are perspective front and back views of the lower leg support portion **102**. In this example, the lower leg support portion **102** includes an upper overlapping member **130**, a lower overlapping member **132**, a left side wall **134**, a right side wall **136**, and a back side wall **138**. The lower leg support portion **102** is formed of one piece connecting all of the side walls with both of the overlapping members. The lower leg support portion **102** includes multiple layers that are illustrated and described in detail with reference to FIG. **5**.

The upper overlapping member **130** includes a left side panel **140***a* extending from the left side wall **134** of the lower leg support portion **102** and a right side panel **142***a* extending from the right side wall **136** of the lower leg support portion **102**. The upper overlapping member **130** has a fastening mechanism **144***a* to connect the left side panel **140***a* together with the right side panel **142***a*. In some embodiments, the fastening mechanism **144***a* includes a hook patch **146** and a loop patch **148**. In other embodiments, other fastening mechanisms are used, such as, buttons, adhesive, hooks, clips, clasps, bolts, straps, or combinations of these or other fastening mechanisms. The loop patch **148** is attached to the exterior surface of the left side panel **140***a* of the upper overlapping member **130** and the hook patch **146** is attached to the right side panel **142***a* of the upper overlapping member **130**. In this example, the hook patch **146** and the loop patch **148** are sewn onto respective panels of the upper overlapping member **130** to be fastened together as the two overlap. In other embodiments, the arrangement and configuration of the hook patch **146** and the loop patch **148** can vary.

The lower overlapping member **132** includes a left side panel **140***b* extending from the left side wall **134** of the lower leg support portion **102** and a right side panel **142***b* extending from the right side wall **136** of the lower leg support portion **102**. The lower overlapping member **132** has a fastening mechanism **144***b* to connect the left side panel **140***b* together with the right side panel **142***b*. The lower overlapping member **132** may also be provided with a hook patch **146** and a loop patch **148** as the fastening mechanism **144***b* similar to those described for the upper overlapping member **130**. Accordingly, many of the concepts and features for the lower overlapping member **132** are similar to the upper overlapping member **130** previously described herein. In some embodiments, the lower overlapping member **132** is color coded such that the hook patch **146** and loop patch **148** colors are different from other fastening mechanisms, i.e. the upper overlapping member **130**. This feature helps to identify for the patient where each overlapping member should be attached if the heel float therapeutic boot **100** becomes crumpled or twisted.

In this example, the upper and lower overlapping members **130**, **132** of the lower leg support portion **102** are arranged and configured to wrap and fasten about an anterior portion of the lower leg. In other examples, the lower leg support portion **102** may extend further up the leg. In some embodiments, the upper overlapping member **130** and the lower overlapping member **132** are arranged and configured to define an opening **150** in the front of the lower leg support portion **102** of the heel float therapeutic boot **100**. This opening may help provide a cooling feature for the patient when warming is not so critical. It is to be understood that other configurations may be used, such as, but not limited to, a closed configuration having no opening, a slide on boot, or a slip on boot, and combinations of these and other configurations.

Referring to FIG. **4**, the left side wall **134** of the lower leg support portion **102** and the right side wall **136** of the lower leg support portion **102** are integrally formed with the back side wall **138** of the lower leg support portion **102** defining a channel **152** (shown in FIG. **3**) for receiving a lower leg of a patient. In this example, the left side wall **134** of the lower leg support portion **102** and the right side wall **136** of the lower leg support portion **102** has loop material **154** vertically positioned along the left and right side of the lower leg support portion **102**. In this example, the wing support structure **106** is configured to fasten along the loop material **154** positioned on the left and right side of the lower leg support portion **102**.

FIG. **5** is a component view of a portion of the heel float therapeutic boot **100** depicting layers of the lower leg support portion **102**. In this example, the lower leg support portion **102** includes a fleece material **156**, a lining **158**, a heel float cradle **160** and exterior fabric **162**. The construction and materials used in the heel float therapeutic boot **100** provides the proper support and protection needed for patients.

The fleece material **156** includes the entire lining **158** of the heel float therapeutic boot **100** and is positioned to surround the lower leg of the patient. In this example, the fleece material **156** covers the entire interior of the heel float therapeutic boot **100** to provide for a soft, smooth/comfortable surface to contact the skin without any abrading seams that can cause skin ulcerations. In some embodiments, the fleece material **156** is laminated to the lining **158** of the heel float therapeutic boot **100**. In other embodiments, the fleece material **156** can be placed on the lining **158** by other attachment means, such as, adhesive, sewing, or combinations of these or other attachment means.

The lining **158** helps wick moisture away and ventilate the lower leg and foot. Moisture typically develops at regions of sustained contact between the skin and the fleece material **156**. In some embodiments, seams can be located between sections of the fleece material **156** and/or lining **158** to minimize contact with the skin. These seams can be sewn or adhesively fixed in the heel float therapeutic boot **100**.

The heel float cradle **160** is typically a relatively dense elastic material that flexes or compresses slightly to provide a resilient interface with the lower leg, for example, foam. In this example, the heel float cradle **160** is positioned between the exterior fabric **162** of the heel float therapeutic boot **100** and the lining **158** of the heel float therapeutic boot **100**. In some embodiments, the heel float cradle **160** extends along the length of the lower leg support portion **102** and the foot support portion **104**. The heel float cradle **160** is illustrated and described in more detail with reference to FIG. **6**.

The exterior fabric **162** is constructed of an air permeable material, for example, a durable velour cloth. In some embodiments, other materials such as a heavy weight cotton fabric, CORDURA® or other fabric or fabric combinations might also be used. The exterior fabric **162** covers the entirety of the heel float therapeutic boot **100**.

FIGS. **6-7** illustrate features of the heel float cradle **160**.

FIG. **6** is a perspective of an example of a heel float cradle **160**. In this example, the heel float cradle **160** includes a lower leg support cradle **164** and a foot support platform **166**. In this example, the lower leg support cradle **164** and the foot support platform **166** are connected together to form one continuous piece. The heel float cradle **160** can for example be constructed of a variety of materials including elastomers, polyurethane foam, and/or other open and/or closed cell foams or combinations thereof. The durometer and resilience of the material preferably compresses slightly and springs back to shape upon relieving any pressure. The foot support platform **166** is illustrated and described in more detail with reference to FIGS. **11-12**.

In this example, the lower leg support cradle **164** includes a posterior flat surface **170** and side walls **172** that extend along the longitudinal sides of the lower leg. The lower leg support cradle **164** provides a longitudinal channel **168** that receives the lower leg of a patient. The posterior flat surface **170** stabilizes the lower leg support cradle **164** and lower leg against rotation when the patient rests in a supine position and the heel float therapeutic boot **100** is supported on a bed. In this example, the lower leg support cradle **164** has a U-shaped cross-section. In other embodiments, the lower leg support cradle **164** has other cross-sectional shapes, such as, a circular shape.

FIG. **7** is a cross-sectional view of the lower leg support cradle **164** of the heel float cradle **160**. As shown, the lower leg support cradle **164** includes an anterior surface **174** along the longitudinal channel **168**, a raised surface portion **176**, a cutout region **178**, and a peripheral edge **180** of the anterior surface **174**.

In this example, the anterior surface **174** is contoured and exhibits a compound arcuate shape to support the lower leg or calf. The contoured surface helps to distribute and equalize support on the lower leg or calf and prevents pressure points that might induce skin ulcerations or abrasion. The raised surface portion **176** of the anterior surface **174** is in the region of the Achilles tendon and is shaped to elevate and support the heel in the cutout region **178** with minimal pressure and contact with the boot and away from any support structure, such as a bed, foot stool etc. In this example, the cutout region **178** is an inverted U-shape being adjacent to the peripheral edge of the anterior surface **174** of the lower leg support cradle **164**. The cutout region **178** is formed to shelter the suspended heel.

FIG. **8** is a perspective view of the foot support portion **104** of the heel float therapeutic boot **100**. In this example, the foot support portion **104** includes a heel tab **182**, an overlapping foot member **184**, and a toe opening **186**. The heel tab **182** and the overlapping foot member **184** are integrally formed and have separate fastening mechanisms. The heel tab **182** can be detached independent of the overlapping foot member **184** either for inspection or ventilation to expose the heel area. The foot support portion **104** has a length that helps to prevent the foot from popping out underneath or over the top of the foot support portion **104**.

In this example, the heel tab **182** has a fastening mechanism **144***c* that connects the heel tab **182** to the loop material **154** vertically positioned along the lower leg support portion **102** of the heel float therapeutic boot **100**. The heel tab **182** is arranged and configured on the left and right side of the heel float therapeutic boot **100**. The heel tab **182** is also provided with a hook patch **146** similar to those described for the upper and lower overlapping members **130**, **132**. Accordingly, the description for the hook patch **146** and the loop patch **148** is hereby incorporated by reference in its entirety for the heel tab **182**.

The overlapping foot member **184** includes a left side panel **188** extending from a left side wall **190** of the foot support portion **104** and a right side panel **192** extending from a right side wall **194** of the foot support portion **104**. In this example, the left and right side panels **188**, **192** are integrally formed with the left and right side walls **190**, **194** respectively. In some embodiments, the overlapping foot member **184** has moisture wicking material to absorb moisture and ventilate the foot. A variety of soft, moisture absorbent, air permeable open weave or porous materials can be used. The inside of the overlapping foot member **184** that faces the foot is covered with the fleece material **156** similar to the upper and lower overlapping members **130**, **132**.

The overlapping foot member **184** has a fastening mechanism **144***d* that connects the left side panel **188** together with the right side panel **192**. The overlapping foot member **184** may also be provided with a hook patch **146** and a loop patch **148** as the fastening mechanism **144***d* similar to those described for the upper and lower overlapping members **130**, **132**. Accordingly, many of the concepts and features for the upper and lower overlapping members **130**, **132** are similar to the overlapping foot member **184**. As such, the description for the hook patch **146** and the loop patch **148** is hereby incorporated by reference in their entirety for the overlapping foot member **184**. In some embodiments, the overlapping foot member **184** has a taper configuration that covers a top portion of the foot while leaving an open portion adjacent to the lower leg support portion **102**. In other embodiments, the overlapping foot member **184** can cover the entire top of the foot.

In this example, the toe opening **186** is formed by the overlapping foot member **184**. The overlapping foot member **184** covers the toes while still providing for ventilation at the toe opening **186**.

FIG. **9** is a bottom perspective view illustrating exemplary features of the foot support portion **104**. In the illustrated example, the foot support portion **104** includes a base **196**, a grip material **198**, and a flexible hinge **200**. The base **196** of the foot support portion **104** has a length L**1** and a width W**1**. In this example, the base **196** of the foot support portion **104** extends beyond the location of the overlapping foot

member **184** that covers the toes. The base **196** of the foot support portion **104** extends past the toes and acts as a stub which can help to protect the patient while shuffling along a floor.

The grip material **198** covers the entire base **196** of the foot support portion **104**. The grip material **198** acts as a non-slip material to facilitate safe ambulation over smooth tile or wood floors. The grip material **198** can be constructed of a variety of non-slip materials and is shaped to essentially align with and underlie the base **196** of the foot support portion **104**. The grip material **198** includes longitudinal sides **202** that extend the length L**1** of the base **196**. The grip material **198** is attached to the exterior fabric **162** along the longitudinal sides **202** in the region of the sole. In this example, the grip material **198** is sewn to the exterior fabric **162** of the heel float therapeutic boot **100**. Other attachment mechanism may be used, such as, but not limiting to, lamination.

The flexible hinge **200** is formed at the location where the lower leg support portion **102** and the foot support portion **104** are connected together.

FIG. **10** is a component view of a portion of the foot support portion **104** depicting layers of material therein. In this example, the foot support portion **104** includes a fleece material **156**, a lining **158**, a foam layer **204**, an interior fabric **206**, the foot support platform **166**, the exterior fabric **162**, and the grip material **198**. As noted above, the foot support platform **166** is illustrated and described in more detail with reference to FIG. **11**. The construction of multiple layers provides a more firm platform for the foot to rest against. The foam layer **204** provides for more cushion to the foot and reduces pressure thereon. The interior fabric **206** is of a type similar to the exterior fabric **162** but rather lined inside portions of the heel float therapeutic boot **100**. Many of the concepts and features for these layers have been disclosed or are similar to the lower leg support portion **102** shown in FIG. **5**. Accordingly, the descriptions of these layers are hereby incorporated by reference in their entirety for the foot support portion **104**.

FIGS. **11-12** illustrate features of the foot support platform **166** of the heel float cradle **160**.

FIG. **11** is a perspective view of the foot support platform **166** of the heel float cradle **160**. In this example, the foot support platform **166** includes an extended flap portion **208**, flaps **210**, apertures **212**, and foam **214**.

The extended flap portion **208** is arranged and configured to align with the base **196** of the foot support portion **104**. In this example, the extended flap portion **208** is constructed of closed cell foam, approximately ⅛-inch thick. In other embodiments, the thickness of the extended flap portion **208** can be greater or less. A proximal end of the extended flap portion **208** is bonded to a recess **216** (depicted in FIG. **12**) formed into the posterior flat surface **170** of the lower leg support cradle **164** adjacent an inverted U-shaped cutout region **178** being adjacent to the peripheral edge of the anterior surface **174** of the lower leg support cradle **164**. The lower leg support cradle **164** and the foot support platform **166** are married together at the recess **216** to create the hinge **200** point in the heel float therapeutic boot **100**. The extended flap portion **208** includes apertures **212** to aerate the foot.

The flaps **210** extend from opposite sides of the extended flap portion **208**. The flaps **210** are joined with the other layers in the foot support portion **104**. In this example, the wing support structure **106** leverages support from the flaps **210** while being adjustably fastened as desired. The wing support structure **106** is illustrated and described in more detail with reference to FIGS. **14-16**. The layers of the foot support portion **104** are attached together along the flaps **210** in the region of the sole. In this example, the layers are sewn together through the flaps **210**.

The foam **214** is positioned on the extended flap portion **208** at the proximal end below the raised heel. The foam **214** is below the cutout region **178** and provides the cushion for the patient's heel. In this example, the foam **214** is shaped as a half moon. In other embodiments, the foam **214** can take the form of other shapes, such as, circles, square, or rectangular etc.

FIG. **13** depicts a cross-sectional view of an example of a patient's foot in the heel float therapeutic boot **100**. In this example, the heel is shown elevated with the foot positioned upright at approximately 90 degrees.

FIG. **14** is a side perspective view of an example of the wing support structure **106** attached to a heel float therapeutic boot **100**. The wing support structure **106** of the heel float therapeutic boot **100** supports the foot in a preferred position. The wing support structure **106** is attached to the heel float therapeutic boot **100** and is configured to be adjustable to obtain the preferred position. The arrangement and configuration of the back side **228** of the wing support structure **106** provides for flexibility of attaching the wing support structure **106** to the loop material **154** that helps place the foot support portion **104** in the proper position. The wing support structure **106** can be placed anywhere along the loop material **154** as desired. The positioning of the wing support structure **106** will vary with each patient. A proper fit can be obtained for any patient from a pediatric size foot up to a man's size 14 foot. The configuration of the wing support structure **106** also provides for easy access to the heel of the foot.

The wing support structure **106** is adjustable to be positioned along the loop material **154**. In this example, the wing support structure **106** is adjustable along the lower leg support portion **102** perpendicular to Axis A. Axis A extends longitudinally through the foot support portion **104**. The wing support structure **106** has the flexibility to position the foot between 75-110 degrees about axis A. This feature provides for a patient to have the ability to access any part of the bottom of the foot and position the foot as desired. The width W**2** of the bottom side **22** of the wing support structure **106** and the configuration of attachment not only helps to keep the foot in an upright position, but it also helps to keep the foot in place so that it is less likely to rotate or migrate around inside of the heel float therapeutic boot **100**.

FIGS. **15-16** illustrate features of the wing support structure **106**.

FIGS. **15-16** are perspective views of the wing support structure **106**.

Referring to FIG. **15**, the bottom side **222** of the wing support structure **106** is sewn along the longitudinal sides **202** and intersects together with the layers in the foot support portion **104**. Portions of the wing support structure **106** extend beyond the sewn area along the longitudinal sides **202** to help prevent the wing support structure **106** from detaching from the foot support portion **104**. The bottom side **222** of the wing support structure **106** has a width W**2** that extends along a portion of the base **196** of the foot support portion **104**. The bottom side **222** of the wing support structure **106** is positioned mostly centered on the base **196**. The configuration of the wing support structure **106** eliminates the problem of generating pressure points underneath the foot because no portion of the wing support structure **106** goes across the ball of the foot. The wing support structure **106** is anchored to the sole and helps to

spread the pressure points or force across the patient's foot while holding the foot support portion **104** of the heel float therapeutic boot **100** in a desired position. The wing support structure **106** is arranged and configured to keep the foot support portion **104** of the heel float therapeutic boot **100** pulled up or upright.

In the illustrated example, the wing support structure **106** includes a left support wing **218** and a right support wing **220**. The left and right support wings **218**, **220** are arranged and configured on opposite sides of the heel float therapeutic boot **100**. The left and right support wings **218**, **220** are each attached to the heel float therapeutic boot **100** along the longitudinal sides **202** in the region of the sole. In the illustrated example, the left and right support wings **218**, **220** are permanently fastened to the foot support portion **104**. The configuration provides for a wing support structure **106** that is non-adjustable in relation to the foot support portion **104**. The wing support structure **106** is adjustably fastenable along the sides of the lower leg support portion **102** (shown in FIG. **14**). The wing support structure **106** is wide enough and fixed to the foot support portion **104** to help prevent the foot of a patient from wrapping across the top of the heel float therapeutic boot **100** or popping out underneath the heel float therapeutic boot **100**. The wing support structure **106** has a wide area to help disperse any points of pressure, which lowers the likelihood of having a pressure area anywhere in the foot region. Having the wing support structure **106** permanently attached at the sole not only helps to prevent pressure points on the foot but it also helps to eliminate improper positioning of the strap over the foot.

Referring to FIG. **16**, the wing support structure **106** includes a bottom side **222**, an opposing top side **224**, a front side **226**, a back side **228**, and a loop stripe **230**. The wing support structure **106** further includes a length L**2** and a width W**2**.

In the illustrated example, the front side **226** of the wing support structure **106** is angled relative to the back side **228** of the wing support structure **106** such that the top side **224** of the wing support structure **106** is narrower than the bottom side **222** of the wing support structure **106**. The front side **226** of the wing support structure **106** being about 9 to 11 inches in length. The top side **224** of the wing support structure **106** includes a hook patch **146** as already described above. The top side **224** is attached to the loop material **154** to position the wing support structure **106** as desired. The top side **224** of the wing support structure **106** being about 1 to 2 inches in length.

In the illustrated example, the back side **228** of the wing support structure **106** is about 9 to 10 inches in length. The back side **228** has an angled portion **228***a* parallel to the front side **226** of the wing support structure **106**. The angled portion **228***a* is about 4 to 5 inches in length. The angled portion **228***a* extends from the bottom side **222** of the wing support structure **106**. The angled portion **228***a* forms a perpendicular portion **228***b* that is perpendicular to the bottom side **222** of the wing support structure **106**. The perpendicular portion **228***b* being about 4 to 5 inches in length. In other embodiments, other shapes and configurations are possible. The left and right support wings **218**, **220** are shaped expanding a length and width with respect to the heel float therapeutic boot **100**. In other embodiments, other shapes and configurations are possible.

The left and right support wings **218**, **220** each include moisture wicking material similar to the overlapping foot member **184**. The left and right support wings **218**, **220** each have a fastening mechanism **144***e*. As illustrated in FIG. **14**, the left and right support wings **218**, **220** are provided with the hook patch **146** and the loop material **154** as the fastening mechanism **144***e* similar to those described above. As such, the description for the hook patch **146** and the loop material **154** is hereby incorporated by reference in their entirety for the left and right support wings **218**, **220**.

FIG. **17** is a flow chart illustrating an example method **250** of making a heel float therapeutic footwear apparatus **100**. In this example, the method **250** includes operations **252**, **254**, and **256**.

The operation **252** is performed to form a lower leg support portion **102** and a foot support portion **104**. Examples of the lower leg support portion **102** and the foot support portion **104** are shown and described with reference to FIGS. **1-3**. In some embodiments, the foot support portion **104** includes a foot support platform **166**. An example of a foot support platform **166** is shown and described with reference to FIG. **11**.

The operation **254** is performed to form the wing support structure **106**. In some embodiments, the wing support structure **106** includes at least one support wing **106**(A,B). In some embodiments, the wing support structure includes a left support wing **106**A and a right support wing **106**B. The support wings **106** include a first end portion and a second end portion. The second end portion is configured to be adjustably fastened to opposite sides of the lower leg support portion. Examples of the wing support structure **106** and support wings **106**A and **106**B are illustrated and described in more detail in FIGS. **14-16**.

The operation **256** is performed to permanently fasten the first end portion of the support wing **106**(A,B) to the foot support portion **104**. In some embodiments, operation **256** includes permanently fastening the first end portions of the left and right support wings **106**A and **106**B to the foot support portion **104**. In some embodiments, the one or more support wings **106** are permanently fastened to the foot support platform **166**. An example of the fastening operation is sewing with thread. Other fastening operations can also be used, such as described herein. Examples showing the attachment of the wing support structure **106** and support wings **106**A and **106**B to the foot support portion **104** are shown in FIGS. **1** and **14**.

After the heel float therapeutic footwear apparatus **100** has been made, a method of using the heal float therapeutic footwear apparatus **100** can be performed. In one example embodiment, the heel float therapeutic footwear apparatus **100** is arranged on a foot and lower leg of a patient, such as illustrated in FIG. **13**. The foot and lower leg are then secured in the heel float therapeutic footwear apparatus **100** using the various panels and fasteners described herein. Additionally, the second end of one or more of the support wings **106**A and **106**B are adjustably secured to sides of the lower leg support **102**. The heal float therapeutic footwear apparatus **100** securely supports the foot and lower leg in a desired position. The various embodiments described above are provided by way of illustration only and should not be construed to limit the claims attached hereto. Those skilled in the art will readily recognize various modifications and changes that may be made without following the example embodiments and applications illustrated and described herein, and without departing from the true spirit and scope of the following claims.

What is claimed is:

1. A heel float therapeutic footwear apparatus comprising:

a lower leg support portion configured to support a lower leg of a patient, the lower leg support portion including a lower leg support cradle having a raised portion, the raised portion configured to elevate a heel of the patient

when the patient is lying on the patient's back to reduce pressure on the patient's heel;

a foot support portion having a base, the foot support portion connected to and extending from the lower leg support portion, the foot support portion including a foot support platform extending from the lower leg support cradle along the base of the foot support portion; and

a wing support structure independent from the lower leg support portion, the wing support structure having a first end portion and a second end portion, the first end portion of the wing support structure being sewn along a longitudinal side of the base to permanently attach the wing support structure to the base, and the wing support structure being adjustably fastenable at the second end portion to a side of the lower leg support portion to adjustably support a position and an angle of the foot support portion with respect to the lower leg support portion.

2. The heel float therapeutic footwear apparatus according to claim **1**, wherein the lower leg support cradle includes:

an anterior surface, the anterior surface extending along a longitudinal channel having an arcuate shape, and being configured to support a lower leg or calf of a patient; and

a cutout region adjacent to a peripheral edge of the anterior surface.

3. The heel float therapeutic footwear apparatus according to claim **1**, wherein the foot support platform includes:

an extended flap portion being configured to align with the base of the foot support portion, the extended flap portion having a proximal end bonded to a recess formed into a posterior flat surface of the lower leg support cradle adjacent the cutout region;

flaps extending from opposite sides of the extended flap portion; and

foam being positioned on the extended flap portion;

wherein the lower leg support cradle and the foot support platform together are connected at the recess.

4. The heel float therapeutic footwear apparatus according to claim **1**, wherein the wing support structure further comprises a left support wing and a right support wing attached on opposite sides of the heel float therapeutic footwear apparatus, wherein the left support wing and the right support wing are spaced from each other.

5. The heel float therapeutic footwear apparatus according to claim **1**, wherein the wing support structure is sewn to the sole of the foot support portion.

6. The heel float therapeutic footwear apparatus according to claim **1**, wherein a width of the wing support structure is at least one half of a length of the foot support portion.

7. The heel float therapeutic footwear apparatus according to claim **1**, wherein a length of the foot support portion is in a range from about 10-inches to about 14-inches.

8. The heel float therapeutic footwear apparatus according to claim **1**, wherein a width of the wing support structure is in a range from about 5-inches to about 7-inches.

9. The heel float therapeutic footwear apparatus according to claim **1**, wherein the wing support structure is connected to the lower leg support portion using a releasable fastener.

10. A heel float therapeutic footwear apparatus comprising:

a lower leg support portion including a left side wall, a right side wall and a back side wall that together support a lower leg of a patient, the left and right side walls of the lower leg support portion each including a releasable fastener vertically positioned thereon, the lower leg support portion including a lower leg support cradle having a raised portion, the raised portion configured to elevate a heel of the patient when the patient is lying on the patient's back to reduce pressure on the patient's heel;

a foot support portion connected to and extending from the lower leg support portion, the foot support portion including a base and a foot support platform extending from the lower leg support cradle; and

first and second wing support structures independent of the lower leg support portion, each of the first and second wing support structures having a first end portion and a second end portion, the first and second wing support structures being sewn along longitudinal sides of the base to permanently attach the wing support structures to the base of the foot support portion, and the wing support structures being adjustably fastenable at the second end portions to the respective releasable fastener on the left and right side walls of the lower leg support portion to adjustably support a position and an angle of the foot support portion with respect to the lower leg support portion.

11. The heel float therapeutic footwear apparatus according to claim **10**, wherein the lower leg support cradle includes:

an anterior surface, the anterior surface extending along a longitudinal channel having an arcuate shape, and being configured to support a lower leg of a patient; and

a cutout region adjacent to a peripheral edge of the anterior surface.

12. The heel float therapeutic footwear apparatus according to claim **10**, wherein the foot support platform includes:

an extended flap portion being configured to align with the base of the foot support portion, the extended flap portion having a proximal end bonded to a recess formed into a posterior flat surface of the lower leg support cradle adjacent the cutout region;

flaps extending from opposite sides of the extended flap portion; and

foam being positioned on the extended flap portion;

wherein the lower leg support cradle and the foot support platform together are connected at the recess.

13. The heel float therapeutic footwear apparatus according to claim **10**, wherein the first and second wing support structures are sewn to the sole of the foot support portion.

14. The heel float therapeutic footwear apparatus according to claim **10**, wherein a width of each one of the first and second wing support structures is at least one half of a length of the foot support portion.

15. The heel float therapeutic footwear apparatus according to claim **10**, wherein a length of the foot support portion is in a range from about 10-inches to about 14-inches.

16. The heel float therapeutic footwear apparatus according to claim **10**, wherein a width of each one of the first and second wing support structures are in a range from about 5-inches to about 7-inches.

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